oxygen containing gas being limited by operating temperature limits of the thermal stages to contain less than or equal to about 28 mole percent oxygen, the improvement comprising:

(a) one or more mid-location catalytic stages between a last thermal stage and a tail gas unit acting sequentially on the effluent of the last thermal stage, the effluent of each mid-location catalytic stage forming a process gas, whereby the process gas from a last mid-location catalytic stage forms a tail gas comprising five mole percent or less hydrogen sulfide which is converted to elemental sulfur in the tail gas unit such that an effluent of the tail gas unit is less than about one half mole percent hydrogen sulfide;

(b) replacing at least some Claus reaction catalyst in one or more of the mid-location catalytic stages with a selective oxidation catalyst; and

(c) reacting a process gas within the one or more mid-location catalytic stages comprising selective oxidation catalyst with oxygen wherein hydrogen sulfide is converted to elemental sulfur.

2. A process for retrofit of a unit for sulfur recovery from one or more acid gases comprising hydrogen sulfide where burners for one or more thermal stages of the sulfur recovery unit are adapted to burn the acid gas with an oxygen containing gas , the oxygen containing gas not being limited by operating temperature limits of the thermal stages to contain less than or equal to about 100 mole percent oxygen, the improvement comprising:

(a) one or more mid-location catalytic stages between a last thermal stage and a tail gas unit acting sequentially on the effluent of the last thermal stage, the effluent of each mid-location catalytic stage forming a process gas, whereby the process gas from a last mid-location catalytic stage forms a tail gas comprising five mole percent or less hydrogen sulfide which is converted to elemental sulfur in the tail gas unit such that an effluent of the tail gas unit is less than about one half mole percent hydrogen sulfide;

(b) replacing at least some Claus reaction catalyst in one or more of the mid-location catalytic stages with a selective oxidation catalyst; and

(c) reacting a process gas within the one or more mid-location catalytic stages comprising selective oxidation catalyst with oxygen wherein hydrogen sulfide is converted to elemental sulfur.

3. A process for sulfur recovery from one or more acid gases comprising hydrogen sulfide where the acid gases are reacted to form an effluent of one or more thermal or oxidation stages, the improvement comprising:

(a) one or more mid-location catalytic stages between a last thermal stage and a tail gas unit acting sequentially on the effluent of the last thermal stage, the effluent of each mid-location catalytic stage forming a process gas, whereby the process gas from a last mid-location catalytic stage forms a tail gas comprising five mole percent or less hydrogen sulfide which is converted to elemental sulfur in the tail gas unit such that an effluent of the tail gas unit is less than about one half mole percent hydrogen sulfide;

(b) one or more of the mid-location catalytic stages comprising a selective oxidation catalyst; and

(c) reacting a process gas within the one or more mid-location catalytic stages comprising selective oxidation catalyst with oxygen wherein hydrogen sulfide is converted to elemental sulfur .

a1

7. The process of claim 3 wherein the degree of hydrogen sulfide conversion to elemental sulfur in step (c) is controlled by limiting the amount of oxygen compared to hydrogen sulfide.

a2

9. The process of claim 3 wherein the mid-location catalytic stages comprise sequential heating means, one or more immediately sequential catalyst beds and a separator / condenser.

10. The process of claim 3 wherein a first mid-location catalytic stage receives the effluent from the last thermal or oxidation stage, the first mid-location catalytic stage has a single catalyst bed containing only selective oxidation catalyst and in the first mid-location catalytic stage or upstream of the first mid-location catalytic stage an oxygen containing gas is mixed with the effluent from the thermal or oxidation stage to provide oxygen for a selective oxidation reaction.

a3